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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XY11

Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Marine Seismic Survey in the Beaufort Sea, Alaska

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of an incidental take authorization.

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA) regulations, notification is hereby given that NMFS has issued an Incidental Harassment Authorization (IHA) to BP Exploration (Alaska), Inc. (BP) to take, by harassment, small numbers of 10 species of marine mammals incidental to ocean bottom cable (OBC) seismic surveys in the Simpson Lagoon area of the Beaufort Sea, Alaska, during the 2012 Arctic open-water season.

DATES: Effective July 1, 2011, through October 15, 2012.

ADDRESSES: Inquiry for information on the incidental take authorization should be addressed to P. Michael Payne, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910. A copy of the application containing a list of the references used in this document, NMFS' Environmental Assessment (EA), Finding of No Significant Impact (FONSI), and the IHA may be obtained by writing to the address specified above, telephoning the contact listed below (see FOR FURTHER INFORMATION

CONTACT), or visiting the Internet at:

http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.

Documents cited in this notice may be viewed, by appointment, during regular business hours, at the aforementioned address.

FOR FURTHER INFORMATION CONTACT: Shane Guan, Office of Protected Resources, NMFS, (301) 427-8401 or Brad Smith, NMFS, Alaska Region, (907) 271-3023.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA (16 U.S.C. 1361 et seq.) direct the Secretary of Commerce (Secretary) to allow, upon request, the incidental, but not intentional taking of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

Authorization shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such taking are set forth.

NMFS has defined "negligible impact" in 50 CFR 216.103 as:

> an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely

> affect the species or stock through effects on annual rates of recruitment or survival.

Section 101(a)(5)(D) of the MMPA established an expedited process by which citizens of the U.S. can apply for an authorization to incidentally take small numbers of marine mammals by harassment. Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as:

> any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

Section 101(a)(5)(D) establishes a 45-day time limit for NMFS review of an application followed by a 30-day public notice and comment period on any proposed authorizations for the incidental harassment of marine mammals. Within 45 days of the close of the comment period, NMFS must either issue or deny issuance of the authorization.

Summary of Request

NMFS received an application on December 20, 2011, from BP for the taking, by harassment, of marine mammals incidental to a 3D OBC seismic survey in the Simpson Lagoon area of the Alaskan Beaufort Sea during the open water season of 2012.

Description of the Specified Activity

The proposed seismic survey utilizes receivers (hydrophones and geophones) connected to a cable that would be deployed from a vessel to the seabed or would be

inserted in the seabed in very shallow water areas near the shoreline. The generation of 3D seismic images requires the deployment of many parallel cables spaced close together over the area of interest. Therefore, OBC seismic surveys require the use of multiple vessels for cable deployment and recovery, data recording, airgun operation, re-supply, and support. The proposed 3D OBC seismic survey in Simpson Lagoon would be conducted by CGGVeritas.

Seismic Source Arrays

A total of three seismic source vessels (two main source vessels and one mini source vessel) would be used during the proposed survey. The sources would be arrays of sleeve airguns. Each main source vessel would carry an array that consists of two sub-arrays. Each sub-array contains eight 40 in^3 airguns, totaling 16 guns per main source vessel with a total discharge volume of 2 × 320 in^3, or 640 in^3. This 640 in^3 array has an estimated source level of ~223 dB re 1 μPa (rms). The mini source vessel would contain one array with eight 40 in^3 airguns for a total discharge volume of 320 in^3. The estimated source level of this 320 in^3 array is 212 dB re 1 μPa (rms).

The arrays of the main source vessels would be towed at a distance of ~30 feet (ft, or 10 m) from the stern at 6 ft (2 m) depth, which is remotely adjustable if needed. The array of the mini source vessel would be towed at a distance of ~20 ft (7 m) from the stern at 3 ft (1 m) depth, also remotely adjustable when needed. The source vessels will travel along pre-determined lines with a speed varying from ~1 to 5 knots, mainly depending on the water depth. To limit the duration of the total survey, the source vessels would be operating in a flip-flop mode, with the operating source vessels alternating shots; this means that one vessel discharges airguns when the other vessel is

recharging. Outside the barrier islands, the two main source vessels would be operating with expected shot intervals of 8 to 10 seconds, resulting in a shot every 4 to 5 seconds due to the flip-flop mode of operation. Inside the barrier islands all three vessels (the two main source vessels and the mini vessel) may be operating at the same time in this manner. The exact shot intervals would depend on the compressor capacity, which determines the time needed for the airguns to be recharged. Seismic data acquisition would be conducted 24 hours per day.

Receivers and Recording Units

The survey area in Simpson Lagoon has water depths of 0 to 9 ft (0 to 3 m) between the shore and barrier islands and 3 to 45 ft (1 to 15 m) depths north of the barrier islands. Because different types of receivers would be used for different habitats, the survey area is categorized by the terms onshore, islands, surf-zone and offshore. Onshore is the area from the coastline inland. Islands are the barrier islands. Surf zone is the 0 to 6 ft (0 to 2 m) water depths along the onshore coastline. Offshore is defined as depths of 3 ft (1 m) or more. There is a zone between 3 and 6 ft (1 and 2 m) which may be categorized both as surf zone and as offshore.

The receivers that would be deployed in water consist of multiple hydrophones and recorder units (Field Digitizing Units or FDUs) placed on Sercel ULS cables. Approximately 5,000 hydrophones would be connected to the ULS cable at a minimum of 82.5 ft (27.5 m) intervals and secured to the ocean bottom cable. Surface markers and acoustic pingers will be attached to the cable at various intervals to ensure that the battery packs can be located and retrieved when needed and to determine exact positions for the hydrophones. This equipment would be deployed and retrieved with cable boats. The

data received at each FDU would be transmitted through the cables to a recorder for further processing. This recorder will be installed on a boat-barge combination and positioned close to the area where data are being acquired. While recording, the boat-barge combination is stationary and expected to utilize a two or four point anchoring system.

In the surf-zone, receivers (hydrophones or geophones) would be bored or flushed up to 12 ft (4 m) below the seabed. These receivers will transmit data through a cable (as described above) and have an attached line to facilitate retrieval after recording is completed.

Autonomous recorders (nodes) would be used onshore and on the islands. The node is located on the ground and its geophone would be inserted into the ground by hand with the use of a planting pole. Deployment of the autonomous receiver units would be done by a lay-out crew on the ground using helicopters for personnel and equipment transport and/or approved summer travel vehicles (onshore) and a support boat (for the islands). Data from nodes can be remotely retrieved from a distance (up to a kilometer). Retrieval of data may be from a boat or a helicopter. Equipment would be picked up after recording is complete.

Survey Design

The total area of the proposed seismic survey is approximately 110 mi^2, which includes onshore, surf-zone, barrier islands, and offshore (see Figure 1.2 of the BP's IHA application). For the proposed survey, the receiver cables with hydrophones and recording units would be oriented in an east-west direction. A total of approximately 44 receiver lines would be deployed at the seafloor with 1,100 – 1,650 ft (367 – 550 m) line

spacing. Total receiver line length would be approximately 500 miles (825 km). The source vessel would travel perpendicular over the offshore receiver cables along lines oriented in a north-south direction. These lines would have a length of approximately 3.75 miles (6.2 km) and a minimum spacing of 660 ft (220 m). The total length of all source lines is approximately 4,000 miles (6,600 km), including line turns.

The position of each receiver deployed onshore, in the surf zone and on the barrier islands will be determined using Global Positioning System (GPS) positioning units. Due to the variable bathymetry of the survey area, determining positions of receivers deployed in water may require more than one technique. A combination of Ocean Bottom Receiver Location (OBRL), GPS and acoustic pingers will be used. For OBRL, the source vessel fires a precisely positioned single energy source multiple times along either side of the receiver cables. Production data may also be used instead of dedicated OBRL acquisition. Multiple energy sources are used to triangulate a given receiver position. In addition, Sonardyne acoustical pingers would be located at predetermined intervals on the receiver lines. The pingers are located on the ULS cables and transmit a signal to a transponder mounted on a vessel. This allows for an interpolation of the receiver locations between the acoustical pingers on the ULS cable and also serves as a verification of the OBRL method. The Sonardyne pingers transmit at 19 - 36 kHz and have a source level of 188 - 193 dB re µPa at 1m.

Vessels and Other Equipment

The proposed Simpson Lagoon OBC seismic survey would involve 14 to 16 vessels, as listed in Table 1 below.

Table 1. Summary of number and type of vessels involved in the proposed Simpson Lagoon OBC seismic survey. The dimensions provided are approximate.

Vessel type	Number	Dimensions	Main activity	Frequency
Source Vessel: Main	2	71 × 20 ft	Seismic data acquisition inside and outside barrier islands	24-hr operation
Source Vessel: Mini	1	55 × 15 ft	Seismic data acquisition inside barrier islands	24-hr operation
Recorder barge with tug boat	1	116.5 × 24 ft (barge); 23 × 15 ft (tug)	Seismic data recording	24-hr operation
Cable boats	5 – 6	42.6 × 13 ft	Deploy and retrieve receiver cables (with hydrophones/geophones)	24-hr operation
Crew transport vessels	2	44 × 14 ft	Transport crew and supplies to and from the working vessels	Intermittently, minimum every 8 hours
Shallow water crew and support boats	2 – 3	34 × 10.5 ft	Transport 2 – 5 people and small amounts of gear for the boats operating in the shallower parts of the survey area	Intermittently
HSSE vessel	1	38 × 15 ft	Support SSV measurements, HSSE (health, safety, security, and environmental) compliance	As required

To deploy and retrieve receivers in water depths less than those accessible by the cable boats (surf-zone), equipment such as airboats, buggies or an Arktos (amphibious craft) and/or Jon boats may be used. Helicopters and/or approved tundra travel vehicles would be used for deployment of receiver units onshore as well on the barrier islands. In the case of helicopters being used, the flight altitude would be at 1,500 feet for 3 to 6 times each day during gear deployment and retrieval on barrier islands and on shore (i.e., for about 14 days in late July and early August for deployment and for about 14 days probably after the Cross Island hunt, which typically ends around September 10).

Vessels and other equipment would be transported to the North Slope in late May/early June by trucks. Equipment would be staged at the CGGVeritas pad for preparation. Vessel preparation would include assembly of navigation and source equipment, cable deployment and retrieval systems and safety equipment. Once

assembled, vessels would be launched at either West Dock or Milne Point. Deployment, retrieval, navigation and source systems will then be tested near West Dock or in the project area prior to commencement of operations.

Crew housing and transfer

The total number of people that would be involved is about 220, including crew on boats, camp personnel, mechanics, and management. There are no accommodations available on the source vessels or cable boats for the crew directly involved in the seismic operations, so crews would be changed out every 8 to 12 hours. Two vessels would be used for crew transfers.

The recorder barge/boat (M/V Alaganik and Hook Point) may accommodate up to 10 people. The barge portion is dedicated to recording and staging of cables, hydrophones and batteries and fuelling operations.

Refueling of vessels would be via other vessels at sea, and from land based sources located at West Dock and Milne Point Unit following approved U.S. Coast Guard procedures. Sea states and the vessel's function will be the determining factors on which method is used.

Dates, Duration and Action Area

BP seeks an incidental harassment authorization for the period July 1 to October 15, 2012. Anticipated duration of seismic data acquisition is approximately 50 days, depending on weather and other circumstances. Transportation of vessels to West Dock would occur by road in late May/early June. It is not anticipated that vessels would need to transit by sea; however, in case this does occur the transit would take place when ice conditions allow and in consideration of the spring beluga and bowhead hunt in the

Chukchi Sea.

The project area encompasses 110 mi^2 in Simpson Lagoon, Beaufort Sea, Alaska. The approximate boundaries of the total surface area are between 70°28'N and 70°39'N and between 149°24'W and 149°55'W (Figure 1.2 of BP's IHA application). About 46 mi^2 (41.8%) of the survey area is located inside the barrier islands in water depths of 0 to 9 ft (0 to 3 m), and 36 mi^2 (32.7%) outside the barrier islands in water depths of 3 to 45 ft (1 to 15 m). The remaining 28 mi^2 (25.5%) of the survey area is located on land (onshore and barrier islands), which is solely being used for deployment of the receivers. The planned start date of seismic data acquisition offshore of the barrier islands is July 1, 2012, depending on the presence of ice. Open water seismic operations can only start when the project area is ice free (i.e. < 10% ice coverage), which in this area normally occurs around mid-July (+/- 14 days). However, BP will not start seismic surveys with airgun operations within the barrier islands before July 25, 2012. Limited layout of receiver cables might be possible on land and barrier islands before the ice has cleared. To limit potential impacts to the bowhead whale migration and the subsistence hunt, no airgun operations would take place in the area north of the barrier islands after August 25, 2012. Surf zone geophone retrieval may continue for a brief period after airgun operations are complete.

Comments and Responses

A notice of NMFS' proposal to issue an IHA to BP was published in the Federal Register on May 1, 2012 (77 FR 25830). That notice described, in detail, BP's proposed activity, the marine mammal species that may be affected by the activity, and the anticipated effects on marine mammals and the availability of marine mammals for

subsistence uses. During the 30-day public comment period, NMFS received three comment letters from the following: the Marine Mammal Commission (Commission), the Alaska Eskimo Whaling Commission (AEWC), and ten private citizens, and a petition letter requesting denial of BP's IHA application.

Any comments specific to BP's application that address the statutory and regulatory requirements or findings NMFS must make to issue an IHA are addressed in this section of the Federal Register notice.

Comment 1: The Commission and AEWC recommended that NMFS continue to include proposed incidental harassment authorization language at the end of Federal Register notices but ensure that the language is consistent with that referenced in the main body of the Federal Register notice.

Response: NMFS agrees that this is a good recommendation and will try to include proposed incidental harassment authorization language at the end of Federal Register notices if there is sufficient time allowing for drafting the IHA language before the proposed IHA Federal Register notice is issued. NMFS will also try to ensure that the language is consistent with that referenced in the main body of the Federal Register notice.

Comment 2: The Commission recommends NMFS use species-specific maximum density estimates or average estimates adjusted by a precautionary correction factor as a basis for (1) estimating the expected number of takes and (2) making its determination regarding whether the total taking would have a negligible impact on the species or stocks. Further, the Commission points out that NMFS used Brandon et al. (2011) data for bowhead whale density estimates but not for belugas summer density of

0.0018 whales/km^2. The Commission questions why NMFS uses the summer density estimate for belugas of 0.0008 whales/km^2, which was derived from aerial surveys conducted in 1982 to 1986 (Moore et al. 2000).

Response: To provide some allowance for the uncertainties, BP calculated both "maximum estimates" as well as "average estimates" of the numbers of marine mammals that could potentially be affected. For a few marine mammal species, several density estimates were available, and in those cases the mean and maximum estimates were determined from the survey data. In other cases, no applicable estimate (or perhaps a single estimate) was available, so adjustments were used to arrive at "average" and "maximum" estimates. The species-specific estimation of these numbers is provided in the Federal Register notice for the proposed IHA (77 FR 25830; May 1, 2012). NMFS has determined that the average density data of marine mammal populations will be used to calculate estimated take numbers because these numbers are based on surveys and monitoring of marine mammals in the vicinity of the proposed project area. For several species whose average densities are too low to yield a take number due to extra-limital distribution in the vicinity of the proposed Beaufort Sea survey area, but whose chance occurrence has been documented in the past, such as gray and killer whales and harbor porpoises, NMFS allotted a few numbers of these species to allow unexpected takes of these species.

The determination regarding whether the total taking would have a negligible impact on the species or stocks is based on the species-specific average density, or based on allotted number from past chance occurrence, as described above and in the proposed Federal Register notice for the proposed IHA (77 FR 25830).

Regarding the reason for using older data for beluga whales summer density, there were several reasons for using the data reported in Moore et al. (2000):

(1) It has been common practice to use data published in peer reviewed journals if these are available for the area and time period of the proposed activity.

(2) Since the Simpson Lagoon seismic survey data will take place mainly in water depths of ≤10 m, the data from 11,985 km of effort collected in water depths of ≤50 m (Moore et al. 2000) was thought to be the most representative.

Comment 3: The Commission requested NMFS provide additional justification for its preliminary determination that the proposed monitoring program will be sufficient to detect, with a high level of confidence, all marine mammals within or entering the identified exclusion and disturbance zones.

Response: The proposed visual monitoring measures for open water seismic and geophysical surveys is a standard mitigation method used by industry and research institutes to reduce potential impacts to marine mammals that might be present in the vicinity of the action area. However, as noted in the Federal Register notice for the proposed IHA, there is no guarantee that all marine mammals within or entering the identified exclusion and disturbance zones would be immediately detected. Monitoring reports from the past have indicated that individual marine mammals have been found within the exclusion zone during the survey, which prompted timely power-down and shut down of seismic airguns. Other means to reduce marine mammal injury and TTS include pre-activity ramp-up and restricting cold start during darkness and inclement weather when the entire 180-dB zone is not visible without using night vision devices (NVDs) and/or forward looking infrared (FLIR). Therefore, although there is no

guarantee that all marine mammals within or entering the identified exclusion zones would be immediately detected, NMFS is confident that it is very unlikely a marine mammal could be injured or receive TTS from exposure to a seismic impulse.

Comment 4: The Commission recommends NMFS restrict the commencement of ramp-up from a full shut-down at night or in periods of poor visibility, regardless of whether the entire 180-dB re 1 μPa exclusion zone is visible. The Commission states that it is questioning the effectiveness of using vessel lights, night vision devices, and/or forward looking infrared to monitor the exclusion zones prior to ramp-up procedures at night or in periods of poor visibility.

Response: NMFS agrees with the Commission's recommendation that no ramp-up from a full shut-down should occur at night or in periods of poor visibility. NMFS further clarified with the Commission that if the entire 180-dB exclusion zone is not visible without using vessel lights, night vision devices, and/or forward looking infrared, then BP should not ramp up from a full shut-down. However, if the entire 180-dB zone is visible without using these devices, then a ramp-up from the full shut-down can be commenced.

Comment 5: The Commission recommends that NMFS specify reduced vessel speeds of 9 knots or less when whales are within 300 m or when weather conditions reduce visibility.

Response: NMFS agrees with the Commission's recommendation that vessels should reduce speed to 9 knots or less when weather conditions reduce visibility. NMFS has specified this additional condition in the final IHA issued to BP. Consistent with the proposed IHA, NMFS is also requiring BP to reduce vessel speed to less than 5 knots

within 300 yards (900 feet or 274 m) of any whale(s).

Comment 6: The Commission recommends that NMFS require BP to report injured and dead marine mammals to NMFS and local stranding network using NMFS' phased approach to reporting, as outlined in the proposed incidental harassment authorization language at the end of the Federal Register notice for the proposed IHA (77 FR 25830; May 1, 2012).

Response: NMFS agrees with and is implementing the Commission's recommendation.

Comment 7: The AEWC states that it is not clear on the limitation on geophysical activity inside the barrier islands prior to July 25th. The AEWC states that the activities proposed by BP are governed by Section 502(a)(2)(A) of the Conflict Avoidance Agreement (CAA), and that BP is not to conduct geophysical activity inside the barrier islands prior to July 25, 2012. However, the AEWC points out that the Federal Register notice for the proposed IHA (77 FR 25830; May 1, 2012) only poses restrictions on BP's seismic activities after August 25, 2012, outside the barrier islands.

Response: After clarifying with BP, NMFS confirmed that BP will not conduct seismic surveys using airguns within the barrier islands prior to July 25, 2012, as agreed in the CAA. NMFS has included this additional condition in the final IHA issued to BP.

Comment 8: The AEWC recommends NMFS consider incorporating an alternative based off of the CAA process into the final Effects of Oil and Gas Activities in the Arctic Ocean Environmental Impact Statement (EIS) on the effects of oil and gas activities in the Arctic Ocean, as they requested in their comments, and this IHA provides

an example of how the process can and should function properly to the benefit of the local community, offshore operators, and the federal government.

Response: This recommendation is not directly related to the issuance of the IHA to BP for the take of marine mammals incidental to its OBC seismic survey in the Simpson Lagoon area of the Beaufort Sea. However, NMFS will continue to work with the AEWC, other Alaska Native marine mammal commissions, and other stakeholders on this issue and others during preparation of the Environmental Impact Statement.

Comment 9: The AEWC states that NMFS's preliminary decision of not requiring BP to have PAM is questionable because the issue of acoustic monitoring has been on the table for many years. AEWC supports the peer review recommendation that PAM needs to be included to monitor for calling marine mammals, and to evaluate calling rates relative to seismic operations or received levels of seismic sounds.

Response: NMFS does not agree with the AEWC's recommendation. The Simpson Lagoon project was designed to avoid the use of airguns outside of the barrier islands during the bowhead whale migration. Because airgun use will be restricted to areas inside the barrier islands during the bowhead migration north of Simpson Lagoon, and because the barrier islands block much of the sound from airguns and the depths inside the barrier islands are not sufficient to efficiently carry the long wavelength (low frequency) sounds that dominate airgun spectra, sounds above 120 dB are not expected to reach the migration corridor when whales are present. While methods using directional hydrophones to localize whale calls can offer a powerful means of detecting subtle changes in whale call distributions related to industrial activities, the sounds being introduced by the Simpson Lagoon project during the migration will be weak and the

number of days of exposure will be small. With that in mind, operations such as that at Simpson Lagoon would be very unlikely to add anything to our understanding of bowhead whale responses to industrial sounds. Other work that has already been completed (such as the work at Northstar Island for sounds associated with production and the work done by Shell and others to assess responses to airgun sounds) have the capacity to add to our understanding of bowhead whale responses to industrial sounds, but the circumstances surrounding the Simpson Lagoon project suggest that it would fail to produce meaningful (statistically significant) results.

Because of doubts regarding the value of an acoustic localization study undertaken in association with the Simpson Lagoon project, and because timing would have made study design and implementation challenging, BP explored other opportunities to contribute to our collective understanding of potential acoustic impacts in the Beaufort Sea. Although BP measured sound field propagation through barrier islands during its 2008 Liberty seismic operation, the company proposed to undertake recordings that will yield more data regarding propagation of airgun sounds in the presence of barrier islands and shallow water. That work is currently planned to occur during the Simpson Lagoon seismic operation.

Comment 10: Five private citizens requested NMFS deny BP's IHA application due to concerns about the potential for an oil spill.

Response: As described in detail in the Federal Resister notice for the proposed IHA (77 FR 28530; May 1, 2012), BP's proposed Simpson Lagoon project would only involve OBC seismic surveys using airguns and ocean bottom recorders. There will be no oil and gas related drilling or production.

Comment 11: Six private citizens request NMFS deny BP's IHA application because they think seismic impulse would kill marine mammals in the area.

Response: As described in detail in the Federal Resister notice for the proposed IHA (77 FR 28530; May 1, 2012), as well as in this document, NMFS does not believe that BP's Simpson Lagoon OBC seismic surveys would cause injury or mortality to marine mammals. The required monitoring and mitigation measures being implemented would further reduce the adverse effect on marine mammals to the lowest levels practicable. Therefore, NMFS expects that only a small number of marine mammals would be taken by Level B harassment in the forms of temporary behavioral modification and displacement from the survey area. No injury and/or mortality of marine mammals is expected, and none was authorized.

Comment 12: One private citizen requested NMFS deny BP's IHA application for fear that intensive sound could cause mortality to cephalopods and other invertebrates, which are important prey for marine mammals. Citing Andre *et al.* (2011), this person states that immediately following exposure to low frequency sound, the cephalopods showed hair cell damage within the statocysts. Overy time, nerve fibers became swollen and, eventually, large holes appeared.

Response: NMFS is aware of the paper by Andre *et al.* (2011), which was published in the journal *Frontier of Ecology and the Environment.* However, NMFS does not believe the results of the study represent what would happen in a natural environment. In their experiment, Andre *et al.* (2011) used 50–400 Hz sinusoidal wave sweeps with 100% duty cycle and 1-second sweep period for 2 hours in either a 2.000-liter fiberglass reinforced plastic tank or a 200-liter (glass-walled) tank occupied by one

individual of one of the four cephalopod species. The sweep was produced and amplified through an in-air loudspeaker, while the level received was measured by a calibrated B&K 8106 hydrophone (received sound pressure level: 157 ± 5 dB re 1 μPa, with peak levels at 175 dB re 1 μPa). Therefore, the cephalopod in the small tank was exposed to a long-lasting intensive standing wave, instead of propagating waves from short airgun impulses in a free field. In addition, there was no mention of the total sound exposure level (SEL) over the 2-hour exposure period. For these reasons, NMFS did not consider this study in the analysis of acoustic impacts to marine mammal habitat, including prey species.

Description of Marine Mammals in the Area of the Specified Activity

The marine mammal species under NMFS jurisdiction most likely to occur in the seismic survey area include three cetacean species, beluga (Delphinapterus leucas), bowhead whales (Balaena mysticetus), and gray whales (Eschrichtius robustus), and three pinniped species, ringed (Phoca hispida), spotted (P. largha), and bearded seals (Erignathus barbatus).

Four additional cetacean species and one pinniped species: harbor porpoise (Phocoena phocoena), killer whale (Orcinus orca), humpback whale (Megaptera novaeangliae) and minke whale (Balaenoptera acutorostrata), and Ribbon seals (Histriophoca fasciata) could also occur in the project area. Though their occurrence is considered extralimital.

The bowhead and humpback whales are listed as "endangered" under the Endangered Species Act (ESA) and as depleted under the MMPA. Certain stocks or populations of gray and beluga whales and spotted seals are listed as endangered or

proposed for listing under the ESA; however, none of those stocks or populations occur in the proposed activity area. Additionally, the ribbon seal is considered a "species of concern", meaning that NMFS has some concerns regarding status and threats to this species, but for which insufficient information is available to indicate a need to list the species under the ESA. Bearded and ringed seals are "candidate species" under the ESA, meaning they are currently being considered for listing.

BP's application contains information on the status, distribution, seasonal distribution, and abundance of each of the species under NMFS' jurisdiction mentioned. Please refer to the application for that information (see ADDRESSES). Additional information can also be found in the NMFS Stock Assessment Reports (SAR). The Alaska 2011 SAR is available at: http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2011.pdf.

Potential Effects of the Specified Activity on Marine Mammals

Operating active acoustic sources such as airgun arrays, pinger systems, and vessel activities have the potential for adverse effects on marine mammals.

Potential Effects of Airgun Sounds on Marine Mammals

The effects of sounds from airgun pulses might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, and temporary or permanent hearing impairment or non-auditory effects (Richardson et al. 1995). As outlined in previous NMFS documents, the effects of noise on marine mammals are highly variable. The Notice of Proposed IHA (77 FR 28530; May 1, 2012) included a discussion of the effects of airguns on marine mammals, which is not repeated here. That discussion did not take into consideration the monitoring and mitigation measures proposed by BP and NMFS. No cases of temporary threshold shift (TTS) are expected as

a result of BP's activities given the small size of the source, the strong likelihood that baleen whales (especially migrating bowheads) would avoid the approaching airguns (or vessel) before being exposed to levels high enough for there to be any possibility of TTS, and the mitigation measures required to be implemented during the survey described later in this document. Based on the fact that the sounds produced by BP's operations are unlikely to cause TTS in marine mammals, it is extremely unlikely that permanent hearing impairment would result. No injuries or mortalities are anticipated as a result of BP's operations, and none are authorized to occur. Only Level B harassment is anticipated as a result of BP's activities.

Potential Effects of Pinger Signals

A pinger system (Sonardyne Acoustical Pingers) and acoustic releases/transponders would be used for BP's 2012 open water OBC seismic survey in the Beaufort Sea. The specifications of this pinger system (source levels and frequency ranges) were provided in the Notice of Proposed IHA (77 FR 28530; May 1, 2012). The source levels of the pinger are much lower than those of the airguns, which are discussed above. It is unlikely that the pinger produces pulse levels strong enough to cause temporary hearing impairment or (especially) physical injuries even in an animal that is (briefly) in a position near the source.

Anticipated Effects on Habitat

The primary potential impacts to marine mammals and other marine species are associated with elevated sound levels produced by airguns and other active acoustic sources. However, other potential impacts to the surrounding habitat from physical disturbance are also possible.

Potential Impacts on Prey Species

With regard to fish as a prey source for cetaceans and pinnipeds, fish are known to hear and react to sounds and to use sound to communicate (Tavolga et al. 1981) and possibly avoid predators (Wilson and Dill 2002). Experiments have shown that fish can sense both the strength and direction of sound (Hawkins 1981). Primary factors determining whether a fish can sense a sound signal, and potentially react to it, are the frequency of the signal and the strength of the signal in relation to the natural background noise level.

The level of sound at which a fish will react or alter its behavior is usually well above the detection level. Fish have been found to react to sounds when the sound level increased to about 20 dB above the detection level of 120 dB (Ona 1988); however, the response threshold can depend on the time of year and the fish's physiological condition (Engas et al. 1993). In general, fish react more strongly to pulses of sound rather than a continuous signal (Blaxter et al. 1981), and a quicker alarm response is elicited when the sound signal intensity rises rapidly compared to sound rising more slowly to the same level.

Investigations of fish behavior in relation to vessel noise (Olsen et al. 1983; Ona 1988; Ona and Godo 1990) have shown that fish react when the sound from the engines and propeller exceeds a certain level. Avoidance reactions have been observed in fish such as cod and herring when vessels approached close enough that received sound levels are 110 dB to 130 dB (Nakken 1992; Olsen 1979; Ona and Godo 1990; Ona and Toresen 1988). However, other researchers have found that fish such as polar cod, herring, and capelin are often attracted to vessels (apparently by the noise) and swim toward the vessel

(Rostad et al. 2006). Typical sound source levels of vessel noise in the audible range for fish are 150 dB to 170 dB (Richardson et al. 1995).

Some mysticetes, including bowhead whales, feed on concentrations of zooplankton. Some feeding bowhead whales may occur in the Alaskan Beaufort Sea in July and August, and others feed intermittently during their westward migration in September and October (Richardson and Thomson [eds.] 2002; Lowry et al. 2004). However, by the time most bowhead whales reach the Chukchi Sea (October), they will likely no longer be feeding, or if it occurs it will be very limited. A reaction by zooplankton to a seismic impulse would only be relevant to whales if it caused concentrations of zooplankton to scatter. Pressure changes of sufficient magnitude to cause that type of reaction would probably occur only very close to the source. Impacts on zooplankton behavior are predicted to be negligible, and that would translate into negligible impacts on feeding mysticetes. Thus, the activity is not expected to have any habitat-related effects that could cause significant or long-term consequences for individual marine mammals or their populations.

Potential Impacts on Availability of Affected Species or Stock for Taking for Subsistence Uses

Seismic surveys have the potential to impact marine mammals hunted by Native Alaskans. In the case of cetaceans, the most common reaction to anthropogenic sounds (as noted previously in this document) is avoidance of the ensonified area. In the case of bowhead whales, this often means that the animals could divert from their normal migratory path by up several kilometers. Additionally, general vessel presence in the vicinity of traditional hunting areas could negatively impact a hunt.

In the case of subsistence hunts for bowhead whales in the Beaufort Sea, there could be an adverse impact on the hunt if the whales were deflected seaward (further from shore) in traditional hunting areas. The impact would be that whaling crews would have to travel greater distances to intercept westward migrating whales, thereby creating a safety hazard for whaling crews and/or limiting chances of successfully striking and landing bowheads.

The proposed seismic survey would take place between July and September. The project area is located approximately 35 miles northeast from Nuiqsut, 35 miles west from Cross Island, 150 miles west from Kaktovik and 180 miles east from Barrow. Potential impact from the planned activities is expected mainly from sounds generated by the vessel and during active airgun deployment. Due to the timing of the project and the distance from the surrounding communities, it is anticipated to have no effects on spring harvesting and little or no effects on the occasional summer harvest of beluga whale, subsistence seal hunts (ringed and spotted seals are primarily harvested in winter while bearded seals are hunted during July - September in the Beaufort Sea), or the fall bowhead hunt. The community of Nuiqsut may begin fall whaling activities in late August to early September from Cross Island (east of the survey area), and their efforts are typically focused on whales approaching Cross Island so that any harvest would occur before whales approached the survey area. As part of the planned mitigation measures (see below), BP will not start airgun operations within the barrier islands before July 25, 2012, and plans to complete those portions of the survey area outside of the barrier islands prior to August 25, 2012. All seismic activities after this date would take place inshore of the barrier islands, thus avoiding the subsistence bowhead hunt in the area.

Finally, BP has signed a Conflict Avoidance Agreement (CAA), and prepared a Plan of Cooperation (POC) under 50 CFR 216.104 to address potential impacts on subsistence hunting activities. The CAA identifies what measures have been or will be taken to minimize adverse impacts of the planned activities on subsistence harvesting. BP met with the AEWC and communities' Whaling Captains' Associations as part of the CAA development, and established avoidance guidelines and other mitigation measures to be followed where the activities may have an impact on subsistence.

Mitigation Measures

In order to issue an incidental take authorization under Section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stock for taking for certain subsistence uses.

For the BP open-water seismic survey in the Beaufort Sea, NMFS is requiring BP to implement the following mitigation measures to minimize the potential impacts to marine mammals in the project vicinity as a result of the marine seismic survey activities.

The mitigation measures are divided into the following major groups: (1) Sound source measurements, (2) Establishing exclusion and disturbance zones, (3) Vessel and helicopter related mitigation measures, and (4) Mitigation measures for airgun operations. The primary purpose of these mitigation measures is to detect marine mammals within, or about to enter designated exclusion zones and to initiate immediate shutdown or power down of the airgun(s), therefore it's very unlikely potential injury or TTS to marine

mammals would occur, and Level B behavioral of marine mammals would be reduced to the lowest level practicable.

(1) Sound Source Measurements

The acoustic monitoring program has two objectives: (1) to verify the modeled distances to the exclusion and disturbance zones from the 640 in^3 and 320 in^3 airgun arrays and to provide corrected distances to the PSOs; and (2) to measure vessel sounds (i.e., received levels referenced to 1 m from the sound source) of each representative vessel of the seismic fleet, to obtain information on the sounds produced by these vessels.

Verification and Establishment of Exclusion and Disturbance Zones

Acoustic measurements to calculate received sound levels as a function of distance from the airgun sound source will be conducted within 72 hours of initiation of the seismic survey. These measurements will be conducted according to a standard protocol for the 640 in^3 array, the 320 in^3 array and the 40 in^3 gun, both inside and outside the barrier islands.

The results of these acoustic measurements will be used to re-define, if needed, the distances to received levels of 190, 180, 160 and 120 dB. The distances of the received levels as a function of the different sound sources (varying discharge volumes) will be used to guide power-down and ramp-up procedures. A preliminary report describing the methodology and results of the verification for at least the 190 dB and 180 dB (rms) exclusion zones will be submitted to NMFS within 14 days of completion of the measurements.

Measurements of Vessel Sounds

BP intends to measure vessel sounds of each representative vessel. The exact scope of the source level measurements (back-calculated as received levels at 1 m from the source) will follow a pre-defined protocol to eliminate the complex interplay of factors that underlie such measurements, such as bathymetry, vessel activity, location, season, etc. Where possible and practical the monitoring protocol will be developed in alignment with other existing vessel source level measurements.

(2) Establishing Exclusion and Disturbance Zones

Under current NMFS guidelines, the "exclusion zone" for marine mammal exposure to impulse sources is customarily defined as the area within which received sound levels are ≥180 dB re 1 μPa (rms) for cetaceans and ≥190 dB re 1 μPa (rms) for pinnipeds. These safety criteria are based on an assumption that SPL received at levels lower than these will not injure these animals or impair their hearing abilities, but that at higher levels might have some such effects. Disturbance or behavioral effects to marine mammals from underwater sound may occur after exposure to sound at distances greater than the exclusion zones (Richarcdson et al. 1995).

An acoustic propagation model, i.e., JASCO's Marine Operations Noise Model (MONM), was used to estimate the distances to received sound levels of 190, 180, 170, 160, and 120 dB re 1μPa (rms) for pulsed sounds from the 640 in^3 and 320 in^3 airgun arrays. Modeling methodology and results are described in detail in the appendix of the BP's IHA application (Warner and Hipsey 2011). Table 2 summarizes the distances from the source to specific received sound levels based on MONM modeling.

Table 2. Estimated distances to specified received SPL (rms) from airgun arrays with a total discharge volume of 640 in^3, 320 in^3, and 40 in^3.

Received Levels (dB re 1 μPa rms)	Distance in meters (inside barrier islands)			Distance in meters (outside barrier islands)	
	640 in^3	320 in^3	40 in^3	640 in^3	40 in^3
190	310	160	16	120	< 50
180	750	480	59	950	<50
170	1,200	930	300	2,500	120
160	1,800	1,500	700	5,500	810
120	6,400	5,700	3,700	44,000	16,000
Note: Values are based on 2 m tow depth for the 640 in^3 and 40 in^3 array, and a 1 m tow depth for the 320 in^3 array.					

The distances to received sound levels of 160 dB re 1 μPa (rms) of the 640 in^3 airgun array were used to calculate the numbers of marine mammals potentially harassed by the activities. The distances to received levels of 180 dB and 190 dB re 1 μPa (rms) are mainly relevant as exclusion radii to avoid level A harassment of marine mammals through implementation of shut down and power down measures (see details below).

(3) Vessel and Helicopter Related Mitigation Measures,

This proposed mitigation measures apply to all vessels that are part of the Simpson Lagoon seismic survey, including crew transfer vessels.

- Vessel operators shall avoid concentrations or groups of whales and vessels shall not be operated in a way that separates members of a group. In proximity of feeding whales or aggregations, vessel speed shall be less than 10 knots.
- When within 900 feet (300 m) of whales vessel operators shall take every effort and precaution to avoid harassment of these animals by:

- Reducing speed to 5 knots or less when within 300 yards of whales and steering around (groups of) whales if circumstances allow, but never cutting off a whale's travel path;
- Avoiding multiple changes in direction and speed.

- Vessel operators shall check the waters immediately adjacent to a vessel to ensure that no marine mammals will be injured when the vessel's propellers (or screws) are engaged.
- To minimize collision risk with marine mammals, vessels shall not be operated at speeds that would make collisions with whales likely. When weather conditions require, such as when visibility drops, vessels shall reduce speed to 9 knots or below to avoid the likelihood of injury to whales.
- Sightings of dead marine mammals would be reported immediately to the BP representative. BP is responsible for ensuring reporting of the sightings according to the guidelines provided by NMFS.
- In the event that any aircraft (such as helicopters) are used to support the planned survey, the mitigation measures below would apply:
  - Under no circumstances, other than an emergency, shall aircraft be operated at an altitude lower than 1,000 feet above sea level (ASL) when within 0.3 mile (0.5 km) of groups of whales.
  - Helicopters shall not hover or circle above or within 0.3 mile (0.5 km) of groups of whales.

(4) Mitigation Measures for Airgun Operations

The primary role for airgun mitigation during seismic survey is to monitor marine mammals near the seismic source vessel during all daylight airgun operations and during any nighttime start-up of the airguns. During the seismic survey PSOs will monitor the pre-established exclusion zones for the presence of marine mammals. When marine mammals are observed within, or about to enter, designated safety zones, PSOs have the authority to call for immediate power down (or shutdown) of airgun operations as required by the situation. A summary of the procedures associated with each mitigation measure is provided below.

Ramp Up Procedure

Ramp up procedures for an airgun array involve a step-wise increase in the number of operating airguns until the required discharge volume is achieved. The purpose of a ramp up (sometimes also referred to as soft start) is to provide marine mammals in the vicinity of the activity the opportunity to leave the area and thus avoid any potential injury or impairment of their hearing abilities.

The rate of ramp up shall be no more than 6 dB of source level per 5 min period. A common procedure is to double the number of operating airguns at 5-min intervals, starting with the smallest gun in the array. BP states that it intends to double the number of airguns operating at 5 minute intervals during ramp up. For the 640 cu in airgun array of the Simpson Lagoon seismic survey this is estimated to take 20 minutes, and for the 320 in^3 array 15 minutes. During ramp up, the safety zone for the full airgun array will be observed.

The ramp up procedures will be applied as follows:

- A ramp up, following a cold start, can be applied if the exclusion zone has been free of marine mammals for a consecutive 30-minute period. The entire exclusion zone must have been visible during these 30 minutes. If the entire exclusion zone is not visible, then ramp up from a cold start cannot begin.
- Ramp up procedures from a cold start will be delayed if a marine mammal is sighted within the exclusion zone during the 30-minute period prior to the ramp up. The delay will last until the marine mammal(s) has been observed to leave the exclusion zone or until the animal(s) is not sighted for at least 15 or 30 minutes. The 15 minutes applies to small toothed whales and pinnipeds, while a 30 minute observation period applies to baleen whales and large toothed whales.
- A ramp up, following a shutdown, can be applied if the marine mammal(s) for which the shutdown occurred has been observed to leave the exclusion zone or until the animal(s) is not sighted for at least 15 minutes (small toothed whales and pinnipeds) or 30 minutes (baleen whales and large toothed whales). This assumes there was a continuous observation effort prior to the shutdown and the entire exclusion zone is visible.
- If, for any reason, electrical power to the airgun array has been discontinued for a period of 10 minutes or more, ramp-up procedures need to be implemented. Only if the PSO watch has been suspended, a 30-minute clearance of the exclusion zone is required prior to commencing ramp-up.

Discontinuation of airgun activity for less than 10 minutes does not require a ramp-up.

- The seismic operator and PSOs will maintain records of the times when ramp -ups start and when the airgun arrays reach full power.

Power-down Procedures

A power down is the immediate reduction in the number of operating airguns such that the radii of the 190 dB and 180 dB (rms) zones are decreased to the extent that an observed marine mammal is not in the applicable safety zone of the full array. During a power down, one airgun (or some other number of airguns less than the full airgun array) continues firing. The continued operation of one airgun is intended to (a) alert marine mammals to the presence of airgun activity, and (b) retain the option of initiating a ramp up to full operations under poor visibility conditions.

- The airgun array shall be immediately powered down whenever a marine mammal is sighted approaching close to or within the applicable exclusion zone of the full array, but is outside the applicable exclusion zone of the single mitigation airgun.
- If a marine mammal is already within the exclusion zone when first detected, the airguns will be powered down immediately.
- Following a power-down, ramp up to the full airgun array will not resume until the marine mammal has cleared the exclusion zone. The animal will be considered to have cleared the exclusion zone if it is visually observed to have left the exclusion zone of the full array, or has not been seen within the zone

for 15 minutes (pinnipeds or small toothed whales) or 30 minutes (baleen whales or large toothed whales).

Shutdown Procedures

- The operating airgun(s) will be shutdown completely if a marine mammal approaches or enters the 190 or 180 dB (rms) exclusion zone of the smallest airgun.
- Airgun activity will not resume until the marine mammal has cleared the exclusion zone of the full array. The animal will be considered to have cleared the exclusion zone as described above under ramp up procedures.

Poor visibility conditions

BP plans to conduct 24-hour operations. PSOs will not be on duty during ongoing seismic operations during darkness, given the very limited effectiveness of visual observation at night (there will be no periods of darkness in the survey area until mid-August). The proposed provisions associated with operations at night or in periods of poor visibility include the following:

- If during foggy conditions, heavy snow or rain, or darkness (which may be encountered starting in late August), the full 180 dB exclusion zone is not visible without using vessel lights, night vision devices, and/or forward looking infrared, the airguns cannot commence a ramp-up procedure from a full shut-down.
- If one or more airguns have been operational before nightfall or before the onset of poor visibility conditions, they can remain operational throughout the

night or poor visibility conditions. In this case ramp-up procedures can be initiated, even though the exclusion zone may not be visible, on the assumption that marine mammals will be alerted by the sounds from the single airgun and have moved away.

In addition, airguns shall not be fired during long transits when exploration activities are not occurring, including the common firing of one airgun (also referred to as the "mitigation gun" in past IHAs). This does not apply to turns when starting a new track line. Keeping an airgun firing unnecessarily for long periods of time would only introduce more noise into the water.

Mitigation Measures for Subsistence Activities

(1) Subsistence Mitigation Measures

To limit potential impacts to the bowhead whale migration and the subsistence hunt, BP would not conduct airgun operations inside the barrier islands before July 25, and will not conduct airgun operations in the area north of the barrier islands after 25 August.

(2) Plan of Cooperation (POC) and Conflict Avoidance Agreement (CAA)

Regulations at 50 CFR 216.104(a)(12) require IHA applicants for activities that take place in Arctic waters to provide a POC or information that identifies what measures have been taken and/or will be taken to minimize adverse effects on the availability of marine mammals for subsistence purposes.

BP has signed a Conflict Avoidance Agreement (CAA) with the Alaska Eskimo Whaling Commission (AEWC) and communities' Whaling Captains' Associations for the proposed 2012 Simpson Lagoon OBV seismic survey. The main purpose of the CAA

is to provide (1) equipment and procedures for communications between subsistence participants and industry participants; (2) avoidance guidelines and other mitigation measures to be followed by the industry participants working in or transiting in the vicinity of active subsistence hunters, in areas where subsistence hunters anticipate hunting, or in areas that are in sufficient proximity to areas expected to be used for subsistence hunting that the planned activities could potentially adversely affect the subsistence bowhead whale hunt through effects on bowhead whales; and (3) measures to be taken in the event of an emergency occurring during the term of the CAA.

In the CAA, BP agrees to employ a Marine Mammal Observer / Inupiat Communitor (MMO/IC) on board each primary sound source vessel owned or operated by BP in the Beaufort Sea, and that native residents of the eleven villages represented by the AEWC shall be given preference in hiring for MMO/IC positions.

The CAA states that all vessels (operated by BP) shall report to the appropriate Communication Center (Com-Center) at least once every six hours commencing with a call at approximately 06:00 hours. The appropriate Com-Center shall be notified if there is any significant change in plans, such as an unannounced start-up of operations or significant deviations from announced course, and such Com-Center shall notify all whalers of such changes.

The CAA further states that each Com-Center shall have an Inupiat operator ("Com-Center operator") on duty 24 hours per day from August 15, or one week before the start of the fall bowhead whale hunt in each respective village, until the end of the bowhead whale subsistence hunt.

The CAA also states that following the end of the fall 2012 bowhead whale

subsistence hunt and prior to the 2013 pre-season introduction meetings, the industry participant that establishes the Deadhorse and Kaktovik Com Center will offer to the AEWC Chairman to host a joint meeting with all whaling captains of the villages of Nuiqsut, Kaktovik, and Barrow, the Marine Mammal Observer / Inupiat Communicators stationed on the industry participants' vessels in the Beaufort Sea, and with the Chairman and Exective Director of the AEWC, at a mutually agreed upon time and place on North Slope of Alaska, to review the results of the 2012 Beaufort Sea open water season.

In addition, BP has developed a "Plan of Cooperation" (POC) for the proposed 2012 seismic survey in the Simpson Lagoon of the Alaskan Beaufort Sea in consultation with representatives of Nuiqsut Community on the Beaufort Sea coast on issues related to subsistence seal hunting. Mitigation measures similar to those listed in the CAA have been identified in the POC, and a final POC has been delivered to NMFS.

Mitigation Conclusions

NMFS has carefully evaluated these mitigation measures and considered a range of other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another:

- the manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and

- the practicability of the measure for applicant implementation.

Based on our evaluation of the applicant's proposed measures, as well as other measures considered by NMFS and proposed by the independent peer review panel, NMFS has determined that the proposed mitigation measures provide the means of effecting the least practicable impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring and Reporting Measures

In order to issue an ITA for an activity, Section 101(a)(5)(D) of the MMPA states that NMFS must set forth "requirements pertaining to the monitoring and reporting of such taking". The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for ITAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the proposed action area.

Monitoring Measures

(1) Monitoring Measures

The following monitoring measures are required for BP's 2012 open-water seismic survey in the Beaufort Sea.

There will be two vessel-based monitoring programs during the Simpson Lagoon OBC seismic survey. One program involves the presence of protected species observers (PSOs) on the seismic source vessels during the entire seismic survey period. The other vessel-based program involves two PSOs on a monitoring vessel outside the barrier

islands after 25 August.

Visual Monitoring from Source Vessels

Two PSOs will be present on each seismic source vessel. Of these two PSOs, one will be on watch at all times during daylight hours to monitor the 190 and 180 dB exclusion zones for the presence of marine mammals during airgun operations. During the fall bowhead whale migration season the 160 dB disturbance zone will also be monitored for the presence of groups of 12 or more baleen whales. The 120 dB disturbance zone for bowhead cow/calf pairs will be monitored from another vessel (see section "Visual Monitoring Outside the Barrier Islands"). The main objectives of the vessel-based marine mammal monitoring program from the source vessels are as follows:

- To implement mitigation measures during seismic operations (e.g. course alteration, airgun power-down, shut-down and ramp-up);
- To record all marine mammal data needed to estimate the number of marine mammals potentially affected, which must be reported to NMFS within 90 days after the survey;
- To compare the distance and distribution of marine mammals relative to the source vessel at times with and without seismic activity; and
- To obtain data on the behavior and movement patterns of marine mammals observed and compare those at times with and without seismic activity.

Marine Mammal Observer Protocol

BP intends to work with experienced PSOs that have had previous experience working on seismic survey vessels, which will be especially important for the lead PSO

on the source vessels. At least one Alaska Native resident, who is knowledgeable about Arctic marine mammals and the subsistence hunt, is expected to be included as one of the team members aboard the vessels. Before the start of the seismic survey the crew of the seismic source vessels will be briefed on the function of the PSOs, their monitoring protocol, and mitigation measures to be implemented. They will also be aware of the monitoring objectives of the dedicated monitoring vessel, and how their observations can affect the operations.

On all source vessels, at least one observer will monitor for marine mammals at any time during daylight hours (there will be no periods of total darkness until mid-August). PSOs will be on duty in shifts of a maximum of 4 hours at a time, although the exact shift schedule will be established by the lead PSO in consultation with the other PSOs.

The three source vessels will offer suitable platforms for PSOs. Observations will be made from locations where PSOs have the best view around the vessel. During daytime, the PSO(s) will scan the area around the vessel systematically with reticle binoculars (e.g., 7×50 Fujinon) and with the naked eye. Laser range-finding binoculars (Leica LRF 1200 laser rangefinder or equivalent) will be available to assist with distance estimation, using other vessels in the area as targets. Laser range finding binoculars are generally not useful in measuring distances to animals directly.

Communication Procedures

When marine mammals in the water are detected within or about to enter the designated safety zones, the airgun(s) power-down or shut-down procedures will be implemented immediately. To assure prompt implementation of power-downs and shut-

downs, multiple channels of communication between the PSOs and the airgun technicians will be established. During the power-down and shut-down, the PSO(s) will continue to maintain watch to determine when the animal(s) are outside the safety radius. Airgun operations can be resumed with a ramp-up procedure (depending on the extent of the power down) if the observers have visually confirmed that the animal(s) moved outside the exclusion zone, or if the animal(s) were not observed within the safety zone for 15 minutes (pinnipeds and small toothed whales) or for 30 minutes (for baleen whales and large toothed whales). Direct communication with the airgun operator will be maintained throughout these procedures.

Data Recording

All marine mammal observations and any airgun power-down, shut-down and ramp-up will be recorded in a standardized format. Data will be entered into a custom database using a notebook computer. The accuracy of the data entry will be verified by computerized validity data checks as the data are entered and by subsequent manual checking of the database after each day. These procedures will allow initial summaries of data to be prepared during and shortly after the field program, and will facilitate transfer of the data to statistical, graphical, or other programs for further processing and archiving.

Visual Monitoring Outside the Barrier Islands

The main purpose of the PSOs on the monitoring vessel that will operate outside the barrier islands is to monitor the 120 dB disturbance zone during daylight hours for the presence of four or more bowhead cow/calf pairs. The predicted distances to received levels of 120 dB are 6.4 km for the 640 in^3 array and 5.7 km for the 320 in^3 array. The

distance to the 160 dB disturbance zone is small enough (1.8 km for the 640 in^3 and 1.5 km for the 320 in^3 array) to be covered by the PSOs on the source vessels. Of the two PSOs on the monitoring vessel, one will be on watch at all times during daylight hours to monitor the disturbance zones and to communicate any sightings of four bowhead cow/calf pairs to the PSOs on the source vessels. The shift schedule and observer protocol will be similar to that of the PSOs on the source vessels.

Channels of communication between the lead PSOs on the source vessels and the dedicated monitoring vessel will also be established. If four or more bowhead cow/calf pairs are observed within or entering the 120 dB disturbance zone the lead PSO on monitoring vessel will immediately contact the lead PSO on the source vessel, who will ensure prompt implementation of airgun power downs or shutdowns. The lead PSO of the monitoring vessel will continue monitoring the 120 dB zone and notify the PSO on the source vessel when the cow/calf pairs have left the safety zone or when they haven't been observed within the safety zone for 30 minutes. Under these conditions ramp-up can be initiated.

These vessel based surveys outside the barrier islands will be conducted up to 3 days per week, weather depending. Anticipated start date is August 25, 2012, and these surveys will be continuing until the end of the data acquisition period. During this period data acquisition will take place only inside the barrier islands. The vessel will follow transect lines within the 120 dB zone that are designed in such a way that the area ensonified by 120 dB or more will be covered. The exact start and end point will depend on the area to be covered by the source vessels during that particular day.

Monitoring Plan Peer Review

The MMPA requires that monitoring plans be independently peer reviewed "where the proposed activity may affect the availability of a species or stock for taking for subsistence uses" (16 U.S.C. 1371(a)(5)(D)(ii)(III)). Regarding this requirement, NMFS' implementing regulations state, "Upon receipt of a complete monitoring plan, and at its discretion, [NMFS] will either submit the plan to members of a peer review panel for review or within 60 days of receipt of the proposed monitoring plan, schedule a workshop to review the plan" (50 CFR 216.108(d)).

NMFS convened an independent peer review panel to review BP's mitigation and monitoring plan in its IHA application for taking marine mammals incidental to the proposed OBC seismic survey in the Simpson Lagoon of the Alaskan Beaufort Sea, during 2012. The panel met on January 5 and 6, 2012, and provided their final report to NMFS on February 29, 2012. The full panel report can be viewed at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.

The peer review panel report contains recommendations that the panel members felt were applicable to BP's monitoring plans. Specifically the panel commented on issues related to: (1) Vessel-based marine mammal observers (MMOs), (2) MMO training, (3) Data recording, (4) Data analysis, and (5) Acoustical monitoring.

NMFS has reviewed the report and evaluated all recommendations made by the panel. NMFS has determined that there are several measures that BP can incorporate into its 2012 OBC seismic survey. Additionally, there are other recommendations that NMFS has determined would also result in better data collection, and could potentially be implemented by oil and gas industry applicants, but which likely could not be implemented for the 2012 open water season due to technical issues (see below). While

it may not be possible to implement those changes this year, NMFS believes that they are worthwhile and appropriate suggestions that may require a bit more time to implement, and BP should consider incorporating them into future monitoring plans should BP decide to apply for IHAs in the future.

The following subsections lay out measures that NMFS is requiring BP to implement as part of its 2012 OBC seismic survey and measures for future implementation.

To be Implemented for Inclusion in the 2012 Monitoring Plan

(1) Vessel-based Marine Mammal Observers

- Utilize crew members to assist the MMOs. Crew members should not be used as primary MMOs because they have other duties and generally do not have the same level of expertise, experience, or training as MMOs, but they could be stationed on the fantail of the vessel to observe the near field, especially the area around the airgun array and implement a rampdown or shutdown if a marine mammal enters the safety zone (or exclusion zone).
- If crew members are to be used as MMOs, they should go through some basic training consistent with the functions they will be asked to perform. The best approach would be for crew members and MMOs to go through the same training together.
- As BP plans to have a marine mammal survey vessel outside the barrier islands after 25 August, the panel recommends BP use MMOs on the vessel to monitor

for the presence and behavior of marine mammals in the offshore area projected to be exposed to seismic sounds.

(2) MMO Training

- BP could improve its MMO training by implementing panel recommendations from previous years (on other seismic survey programs). These recommendations include:
    - Observers should be trained using visual aids (e.g., videos, photos), to help them identify the species that they are likely to encounter in the conditions under which the animals will likely be seen.
    - Observer teams should include Alaska Natives, and all observers should be trained together. Whenever possible, new observers should be paired with experienced observers to avoid situations where lack of experience impairs the quality of observations.
    - Observers should understand the importance of classifying marine mammals as "unknown" or "unidentified" if they cannot identify the animals to species with confidence. In those cases, they should note any information that might aid in the identification of the marine mammal sighted. For example, for an unidentified mysticete whale, the observers should record whether the animal had a dorsal fin.
    - Observers should use the best possible positions for observing (e.g., outside and as high on the vessel as possible), taking into account weather and other working conditions.

- BP should train its MMOs to follow a scanning schedule that consistently distributes scanning effort according to the purpose and need for observations. For example, the schedule might call for 60 percent of scanning effort to be directed toward the near field and 40 percent at the far field. All MMOs should follow the same schedule to ensure consistency in their scanning efforts.
- MMOs also need training in documenting the behaviors of marine mammals. MMOs should simply record the primary behavioral state (i.e., traveling, socializing, feeding, resting, approaching or moving away from vessels) and relative location of the observed marine mammals.

(3) Data Recording

- MMOs should record observations of marine mammals hauled out on barrier islands. Because of the location of BP's proposed survey, most (if not all) of the marine mammals observed in the lagoon will be pinnipeds. It is feasible that the surveys may alter the hauling out patterns of pinnipeds, so observations of them should be recorded.
- BP should work with its observers to develop a means for recording data that does not reduce observation time significantly. Possible options include the use of a voice recorder during observations followed by later transcriptions, or well-designed software programs that minimize the time required to enter data. Other techniques also may be suitable.

(4) Data Analysis and Presentation of Data in Reports

- Estimation of potential takes or exposures should be improved for times with low visibility (such as during fog or darkness) through interpolation or possibly using a probability approach. For instance, for periods of fog or darkness one could use marine mammal observations obtained during a specified period of time before or after the time when visibility was restricted. Those data could be used to interpolate possible takes during periods of restricted visibility.
- Simpson Lagoon is relatively shallow, and marine mammal distribution likely will be closely linked to water depth. To account for this confounding factor, depth should be continuously recorded by the vessel and for each marine mammal sighting. Water depth should be accounted for in the analysis of take estimates.
- BP should be very clear in their report about what periods are considered "non-seismic" for analyses.
- BP should examine data from BWASP and other such programs to assess possible impacts from their seismic survey.
- The panel states that it believes the best ways to present data and results are described in peer-review reports from previous years. These recommendations include:
    - To better assess impacts to marine mammals, data analysis should be separated into periods when a seismic airgun array (or a single mitigation airgun) is operating and when it is not. Final and comprehensive reports to NMFS should summarize and plot:
        - Data for periods when a seismic array is active and when it is not; and

        - The respective predicted received sound conditions over fairly large areas (tens of km) around operations.
    - To help evaluate the effectiveness of MMOs and more effectively estimate take, reports should include sightability curves (detection functions) for distance-based analyses.
    - To better understand the potential effects of oil and gas activities on marine mammals and to facilitate integration among companies and other researchers, the following data should be obtained and provided electronically in the 90-day report:
        - the location and time of each aerial or vessel-based sighting or acoustic detection;
        - position of the sighting or acoustic detection relative to ongoing operations (i.e., distance from sightings to seismic operation, drilling ship, support ship, etc.), if known;
        - the nature of activities at the time (e.g., seismic on/off);
        - any identifiable marine mammal behavioral response (sighting data should be collected in a manner that will not detract from the MMO's ability to detect marine mammals); and
        - adjustments made to operating procedures.
- BP should improve take estimates and statistical inference into effects of the activities by incorporating the following measures:
    - Reported results from all hypothesis tests should include estimates of the associated statistical power.

- Estimate and report uncertainty in all take estimates. Uncertainty could be expressed by the presentation of confidence limits, a minimum-maximum, posterior probability distribution, etc.; the exact approach would be selected based on the sampling method and data available.

(5) Acoustical Monitoring

- BP should also use the offshore vessel to monitor (periodically) the propagation of airgun sounds from within the lagoon into offshore areas during its marine mammal survey using a dipping hydrophone.
- To help verify the propagation model results, the panel also recommends additional acoustic monitoring with bottom mounted recorders. Recorders should be deployed throughout the seismic survey. One suggestion is to deploy instruments including: one at the cut, or break, between Leavitt and Spy islands at about the 5 m isobath; one north of the center of Leavitt Island at the 10 m isobath; and one off the east end of Pingok Island at the 10 m isobath.

Recommendations to be Considered for Future Monitoring Plans

In addition, the panelists recommended that (1) BP continue to develop and test observational aids to assist with visibility during night, poor light conditions, inclement weather, etc.; and (2) BP conduct additional acoustic monitoring with bottom mounted recorders to monitor for calling marine mammals. It may be possible to evaluate calling rates relative to seismic operations or received levels of seismic sounds. Additionally, Shell will have several acoustic arrays in the general area. Those arrays will provide a

basis for determining locations of calling marine mammals. NMFS should encourage BP to request data from Shell to help examine impacts of the seismic survey on the distribution of calling bowheads and other marine mammals.

After discussion with BP, NMFS decided not to implement these two recommendations for BP's 2012 OBC seismic survey because most of BP's survey would occur during the time when there will be very short low-light hours. As for the second recommendation, NMFS realized that given the complexity in marine mammal passive acoustic localization, BP will not have the time to implement this recommendation for its 2012 survey.

(2) Reporting Measures

Sound Source Verification Reports

A report on the preliminary results of the sound source verification measurements, including the measured 190, 180, 160, and 120 dB (rms) radii of the airgun sources, shall be submitted within 14 days after collection of those measurements at the start of the field season. This report will specify the distances of the exclusion zones that were adopted for the survey.

Technical Reports

The results of BP's 2012 vessel-based monitoring, including estimates of "take" by harassment, shall be presented in the "90-day" and Final Technical reports. The Technical Reports should be submitted to NMFS within 90 days after the end of the seismic survey. The Technical Reports will include:

(a) summaries of monitoring effort (e.g., total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors

affecting visibility and detectability of marine mammals);

(b) analyses of the effects of various factors influencing detectability of marine mammals (e.g., sea state, number of observers, and fog/glare);

(c) species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover;

(d) To better assess impacts to marine mammals, data analysis should be separated into periods when a seismic airgun array (or a single mitigation airgun) is operating and when it is not. Final and comprehensive reports to NMFS should summarize and plot:

- Data for periods when a seismic array is active and when it is not; and
- The respective predicted received sound conditions over fairly large areas (tens of km) around operations;

(e) sighting rates of marine mammals during periods with and without airgun activities (and other variables that could affect detectability), such as:

- initial sighting distances versus airgun activity state;
- closest point of approach versus airgun activity state;
- observed behaviors and types of movements versus airgun activity state;
- numbers of sightings/individuals seen versus airgun activity state;
- distribution around the survey vessel versus airgun activity state; and
- estimates of take by harassment;

(f) Reported results from all hypothesis tests should include estimates of the

associated statistical power when practicable;

(g) Estimate and report uncertainty in all take estimates. Uncertainty could be expressed by the presentation of confidence limits, a minimum-maximum, posterior probability distribution, etc.; the exact approach would be selected based on the sampling method and data available;

(h) The report should clearly compare authorized takes to the level of actual estimated takes; and

Notification of Injured or Dead Marine Mammals

In the unanticipated event that survey operations clearly cause the take of a marine mammal in a manner prohibited by this Authorization, such as an injury (Level A harassment), serious injury or mortality (e.g., ship-strike, gear interaction, and/or entanglement), BP shall immediately cease survey operations and immediately report the incident to NMFS and the Alaska Regional Stranding coordinators. The report must include the following information: (1) time, date, and location (latitude/longitude) of the incident; (2) the name and type of vessel involved; (3) the vessel's speed during and leading up to the incident; (4) description of the incident; (5) status of all sound source use in the 24 hours preceding the incident; (6) water depth; (7) environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility); (8) description of marine mammal observations in the 24 hours preceding the incident; (9) species identification or description of the animal(s) involved; (10) the fate of the animal(s); and (11) photographs or video footage of the animal (if equipment is available).

Activities shall not resume until NMFS is able to review the circumstances of the

prohibited take. NMFS shall work with BP to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. BP may not resume their activities until notified by NMFS via letter, email, or telephone.

In the event that BP discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), BP shall immediately report the incident to NMFS and the NMFS Alaska Stranding Hotline and/or by email to the Alaska Regional Stranding Coordinators, within 24 hours of the discovery. The report must include the same information identified above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS will work with BP to determine whether modifications in the activities are appropriate.

In the event that BP discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in IHA (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), BP shall report the incident to NMFS and the NMFS Alaska Stranding Hotline and/or by email to the Alaska Regional Stranding Coordinators, within 24 hours of the discovery. BP shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. BP can continue its operations under such a case.

Estimated Take by Incidental Harassment

Except with respect to certain activities not pertinent here, the MMPA defines

"harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment]. Only take by Level B behavioral harassment is anticipated as a result of the proposed open-water marine survey program. Anticipated impacts to marine mammals are associated with noise propagation from the survey airgun(s) used in the OBC seismic survey.

The full suite of potential impacts to marine mammals was described in detail in the "Potential Effects of the Specified Activity on Marine Mammals" section found in the Notice of Proposed IHA (77 FR 28530; May 1, 2012). The potential effects of sound from the open-water seismic survey might include one or more of the following: tolerance; masking of natural sounds; behavioral disturbance; non-auditory physical effects; and, at least in theory, temporary or permanent hearing impairment (Richardson et al. 1995). As discussed earlier in this document, the most common impact will likely be from behavioral disturbance, including avoidance of the ensonified area or changes in speed, direction, and/or diving profile of the animal. For reasons discussed previously in this document, hearing impairment (TTS and PTS) is highly unlikely to occur based on the required mitigation and monitoring measures that would preclude marine mammals being exposed to noise levels high enough to cause hearing impairment.

For impulse sounds, such as those produced by airgun(s) used in the shallow hazards survey, NMFS uses the 160 dB_{rms} re 1 μPa isopleth to indicate the onset of Level B harassment. BP provided calculations for the 160- and 120-dB isopleths produced by

these activities and then used those isopleths to estimate takes by harassment. NMFS used the calculations to make the necessary MMPA findings. BP provided a full description of the methodology used to estimate takes by harassment in its IHA application (see ADDRESSES), which was also provided in the Notice of Proposed IHA (77 FR 28530; May 1, 2012). A summary of that information is provided here, as it has not changed from the proposed notice.

BP has requested an authorization to take 11 marine mammal species by Level B harassment. These 11 marine mammal species are: beluga whale (Delphinapterus leucas), killer whale (Orcinus orca), harbor porpoise (Phocoena phocoena), bowhead whale (Balaena mysticetus), gray whale (Eschrichtius robustus), humpback whale (Megaptera novaeangliae), minke whale (Balaenoptera acutorostrata), bearded seal (Erignathus barbatus), ringed seal (Phoca hispida), spotted seal (P. largha), and ribbon seal (Histriophoca fasciata). However, due to the extralimital distribution of humpback whales, NMFS considers that the occurrence of this species in the vicinity of BP's seismic survey area is unlikely.

Basis for Estimating "Take by Harassment"

As stated previously, it is current NMFS policy to estimate take by Level B harassment for impulse sounds at a received level of 160 dB_{rms} re 1μPa. However, not all animals react to sounds at this low level, and many will not show strong reactions (and in some cases any reaction) until sounds are much stronger. Southall et al. (2007) provide a severity scale for ranking observed behavioral responses of both free-ranging marine mammals and laboratory subjects to various types of anthropogenic sound (see Table 4 in Southall et al. (2007)). Tables 7, 9, and 11 in Southall et al. (2007) outline the numbers

of low-frequency cetaceans, mid-frequency cetaceans, and pinnipeds in water, respectively, reported as having behavioral responses to multi-pulses in 10-dB received level increments. These tables illustrate that for the studies summarized the more severe reactions did not occur until sounds were much higher than 160 dB_{rms} re 1μPa.

As described earlier in the document, two main source vessels and a mini source vessel would be used to conduct the OBC seismic surveys in the Simpson Lagoon. Each of the main source vessels would be equipped with two subarrays containing eight 40 in^3 airguns, with a total volume displacement of 640 in^3. The mini source vessel would be equipped with one subarray containing eight 40 in^3 airguns, with a total displacement volume of 320 in^3. Modeling results show that the 160 dB isopleths for the 640 in^3, 320 in^3, and 40 in^3 airgun arrays inside the barrier islands are approximately 1,800 m, 1,500 m, and 700 m from the source, respectively; the 160 dB isopleths for the 640 in^3 and 40 in^3 airgun arrays outside the barrier islands are approximately 5,500 m and 810 m from the source, respectively (Please see above for detailed description of the exclusion and disturbance zones).

The radii associated with received sound levels of 160 dB re 1 μPa (rms) or higher are used to calculate the number of potential marine mammal "exposures" to airgun sounds. The potential number of each species that might be exposed to received pulsed sound levels of ≥160 dB re 1 μPa (rms) is calculated by multiplying the expected species density with the anticipated area to be ensonified to that level during airgun operations. Bowhead and beluga whales are migrating through the area, so every encounter likely involves a new individual. Although seal species are also known to cover large distances, they are expected to linger longer within a certain area, and so one individual might be

exposed multiple times.

The area expected to be ensonified was determined by entering the seismic survey lines into a MapInfo Geographic Information System (GIS). GIS was then used to identify the relevant areas by "drawing" the applicable 160-dB buffer of the 640 in^3 array around each seismic source line and calculating the total area within the buffers. This was done for the survey area outside the barrier islands and inside the barrier islands separately. The area ensonified with pulsed sound levels of ≥160 dB re 1 μPa (rms) from airgun operations outside the barrier islands is estimated as 197.5 mi^2 (512 km^2) and from airgun operations inside the barrier islands 105 mi^2 (272 km^2).

Summer density (see below) estimates of marine mammals will be applied to all (100%) survey effort outside the barrier islands and to 60% survey effort inside the barrier islands. Fall densities are not applied to the outside barrier islands survey effort, since no survey effort is planned after August 25. Fall densities are applied to 100% survey effort inside the barrier islands activity, because some of the source lines will be rerun in order to image the full fold area adequately.

Marine Mammal Density Estimates

Because most cetacean species show a distinct seasonal distribution, density estimates for the central Beaufort Sea have been derived for the summer period (covering July and August) and the fall period (covering September and October). Animal densities encountered in the Beaufort Sea during both of these time periods will further depend on the presence of ice. However, if ice cover within or close to the seismic survey area is more than approximately 10%, seismic survey activities may not start or be halted. Cetacean and pinniped densities related to ice conditions are therefore not included in

BP's IHA application. Pinniped species in the Beaufort Sea do not show a distinct seasonal distribution during the period July-early October and as such density estimates derived for seal species are used for both the summer and fall periods.

In addition to seasonal variation in densities, spatial differentiation is an important factor for marine mammal densities, both in latitudinal and longitudinal gradient. Taking into account the size and location of the proposed seismic survey area and the associated area of influence, only the nearshore zone (defined as the area between the shoreline and the 50 m [164 ft] bathymetry line) of the Beaufort Sea was considered to be relevant for the calculation of densities.

Density estimates are based on best available scientific data. In cases where the best available data were collected in regions, habitats, or seasons that differ from the proposed survey activities, information from monitoring results collected in similar habitats, regions or seasons was used. Some sources from which densities were used include correction factors to account for perception and availability bias in the reported densities. Perception bias is associated with diminishing probability of sighting with increasing lateral distance from the trackline, where an animal is present at the surface but could be missed. Availability bias refers to the fact that the animal might be present but is not available at the surface. The uncorrected number of marine mammals observed is therefore always lower than the actual numbers present. Unfortunately, for most marine mammals not enough information is available to calculate these two correction factors. The density estimates provided in the BP's IHA request are therefore based on uncorrected data, unless mentioned otherwise.

Because the available density data is not always representative for the area of

interest, and correction factors were not always known, there is some uncertainty in the data and assumptions used in the density calculations. To provide allowance for these uncertainties, maximum density estimates have been provided in addition to average density estimates. The marine mammal densities presented are believed to be close to, and in most cases higher than, the densities that are expected to be encountered during the proposed survey.

Detailed density information of marine mammal species present in the vicinity of BP's OBC seismic area is described in detail in the Federal Register notice for the proposed IHA (77 FR 28530; May 1, 2012). Table 3 is the summary of the marine mammal density used to calculate estimated takes.

Table 3. Expected densities of marine mammals in the Simpson Lagoon survey area.

Species	Summer densities (#/km^2)	Autumn densities (#/km^2)
Bowhead whale	0.0065	0.1226
Beluga whale	0.0008	0.0136
Ringed seal	0.1680	0.1680
Bearded seal	0.0124	0.0124
Spotted seal	0.0020	0.0020

Potential Number of Takes by Harassment

Numbers of marine mammals that might be present and potentially taken are summarized in Table 4 based on available data about mammal distribution and densities at different locations and times of the year as described above.

Some of the animals estimated to be exposed, particularly migrating bowhead whales, might show avoidance reactions before being exposed to ≥160 dB re 1 μPa (rms). Thus, these calculations actually estimate the number of individuals potentially exposed

to ≥160 dB (rms) that would occur if there were no avoidance of the area ensonified to that level.

For beluga whales and spotted seals that may form groups, additional takes were requested on top of the density-based take calculation in the event a large group is encountered during the survey. For marine mammal species that are extralimital and for which no density estimates are available in the vicinity of the proposed project area (such as gray, minke, and killer whales, harbor porpoise, and ribbon seal), a small number of takes have been requested in case they are encountered (Table 4).

Table 4. Estimates of the possible numbers of marine mammals taken by Level B harassment (exposed to ≥160 dB re 1 µPa (rms)) during BP's proposed seismic program in the Beaufort Seas, July - October 2012.

Species	Outside Barrier Islands	Inside Barrier Islands		Total Estimated Takes
	Summer	Summer	Autumn	
Bowhead whale	3	1	33	37
Beluga whale	0	0	4	50*
Gray whale				3
Minke whale				2
Killer whale				3
Harbor porpoise				3
Ringed seal	60	19	32	111
Bearded seal	9	3	5	17
Spotted seal	1	0	1	20*
Ribbon seal				3

* Additional takes were requested in the event that a large group of beluga whales and spotted seals is encountered.

Estimated Take Conclusions

Cetaceans—Effects on cetaceans are generally expected to be restricted to avoidance of an area around the seismic survey and short-term changes in behavior, falling within the MMPA definition of "Level B harassment".

Using the 160 dB criterion, the average estimates of the numbers of individual cetaceans exposed to sounds ≥160 dB (rms) re 1 µPa represent varying proportions of

the populations of each species in the Beaufort Sea and adjacent waters. For species listed as "Endangered" under the ESA, the estimates include approximately 37 bowheads. This number is approximately 0.24% of the Bering-Chukchi-Beaufort population of over 15,232 assuming 3.4% annual population growth from the estimate of over 10,545 animals in 2001 (Zeh and Punt 2005). For other cetaceans that might occur in the vicinity of the Simpson Lagoon survey area, they also represent a very small proportion of their respective populations. The average estimates of the number of belugas (with additional takes to account for a chance encounter of a large group) that might be exposed to 160 dB re 1 μPa is 50, which represents 0.13% of the Beaufort Sea population (or 1.35% of the Eastern Chukchi Sea population, or a mix between these two populations) of the beluga whales. In addition, the average estimates of gray, minke, and killer whales, and harbor porpoise that might be exposed to ≥160 dB re 1 μPa are 3, 2, 3,and 3. These numbers represent 0.02%, 0.20%, 0.96%, and 0.0062% of these species of their respective populations in the proposed action area.

Although humpback whales are not likely to be encountered in BP's proposed seismic survey area, NMFS has analyzed the possibility of an occasional exposure of up to 2 humpback whales to received noise levels by Level B behavioral harassment. This would represent 0.21% of the Western North Pacific stock of approximately 938 humpback whales in the proposed action area. Based on the analysis, NMFS has determined that such level of take will have negligible impacts to the humpback whales. Since analysis conducted by NMFS' Alaska Regional Office (AKRO) on section 7 consultation on ESA-listed species showed that humpback whales would not be affected, no humpback whale take is authorized by AKRO, therefore, the final IHA does not

include takes of humpback whale as well.

Seals—A few seal species are likely to be encountered in the study area, but ringed seal is by far the most abundant in this area. The average estimates of the numbers of individuals exposed to sounds at received levels ≥160 dB (rms) re 1 μPa during the proposed shallow hazards survey are as follows: ringed seals (111), bearded seals (17), spotted seals (20, with additional takes to count for chance encounter of a group), and ribbon seals (2). These numbers represent 0.05%, 0.01%, 0.03%, and 0.0033% of Alaska stocks of ringed, bearded, spotted, and ribbon seals, respectively.

Negligible Impact and Small Numbers Analysis and Determination

NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival." In making a negligible impact determination, NMFS considers a variety of factors, including but not limited to: (1) the number of anticipated mortalities; (2) the number and nature of anticipated injuries; (3) the number, nature, intensity, and duration of Level B harassment; and (4) the context in which the takes occur.

No injuries or mortalities are anticipated to occur as a result of BP's 2012 OBC seismic survey in the Simpson Lagoon of the Alaskan Beaufort Sea, and none are authorized. In addition, these surveys will use relatively small 640 in^3 airgun arrays, which have much less acoustic power outputs compared to conventional airgun arrays with displacement volume in the range of thousands cubic inches. Additionally, the survey areas are in shallow waters, with approximately 42% of the survey area located

inside the barrier islands (depth: 0 – 9 ft, or 0 – 3 m) and 33% located outside the barrier islands (depth: 3 – 45 ft, or 1 – 15 m), where horizontal sound propagation of low frequency airgun pulses is severely limited. For the seismic survey inside the barrier islands, the islands provide a natural barrier that would effectively reduce sound propagation out to the open ocean, if not completely eliminate its propagation. The modeled isopleths at 160 dB within the barrier islands is expected to be approximately 1.8 km, and 5.5 km outside barrier islands, from an airgun array of 640 in^3 (see discussion earlier). Additionally, animals in the area are not expected to incur hearing impairment (i.e., TTS or PTS) or non-auditory physiological effects. Takes will be limited to Level B behavioral harassment. Although it is possible that some individuals of marine mammals may be exposed to sounds from the proposed seismic survey activities more than once, the expanse of these multi-exposures are expected to be less extensive since both the animals and the survey vessels will be moving constantly in and out of the survey areas.

Most of the bowhead whales encountered during the summer will likely show overt disturbance (avoidance) only if they receive airgun sounds with levels ≥ 160 dB re 1 μPa. Odontocete reactions to seismic energy pulses are usually assumed to be limited to shorter distances from the airgun(s) than are those of mysticetes, probably in part because odontocete low-frequency hearing is assumed to be less sensitive than that of mysticetes. However, at least when in the Canadian Beaufort Sea in summer, belugas appear to be fairly responsive to seismic energy, with few being sighted within 6–12 mi (10–20 km) of seismic vessels during aerial surveys (Miller et al. 2005). Belugas will likely occur in small numbers in the Beaufort Sea during the survey period and few will

likely be affected by the survey activity. In addition, due to the constant moving of the survey vessel, the duration of the noise exposure by cetaceans to seismic impulse would be brief. For the same reason, it is unlikely that any individual animal would be exposed to high received levels multiple times.

Taking into account the mitigation measures that are planned, effects on cetaceans are generally expected to be restricted to avoidance of a limited area around the survey operation and short-term changes in behavior, falling within the MMPA definition of "Level B harassment". The many reported cases of apparent tolerance by cetaceans of seismic exploration, vessel traffic, and some other human activities show that co-existence is possible. Mitigation measures such as controlled vessel speed, dedicated marine mammal observers, non-pursuit, and shut downs or power downs when marine mammals are seen within defined ranges will further reduce short-term reactions and minimize any effects on hearing sensitivity. In all cases, the effects are expected to be short-term, with no lasting biological consequence.

Of the eleven marine mammal species with possible occurrence in the proposed marine survey area, only the bowhead and humpback whales are listed as endangered under the ESA. These species are also designated as "depleted" under the MMPA. Despite these designations, the Bering-Chukchi-Beaufort stock of bowheads has been increasing at a rate of 3.4 percent annually for nearly a decade (Allen and Angliss 2010). Additionally, during the 2001 census, 121 calves were counted, which was the highest yet recorded. The calf count provides corroborating evidence for a healthy and increasing population (Allen and Angliss 2010). The occurrence of humpback whales in the proposed marine survey areas is considered extralimital, and therefore no takes are

included in the IHA. There is no critical habitat designated in the U.S. Arctic for the bowhead and humpback whale. The Alaska stock of bearded seals, part of the Beringia distinct population segment (DPS), and the Arctic stock of ringed seals, have been proposed by NMFS for listing as threatened under the ESA (bearded seals: 75 FR 77496; December 10, 2011; ringed seal: 75 FR 77476; December 10, 2011). None of the other species that may occur in the project area are listed as threatened or endangered under the ESA or designated as depleted under the MMPA.

Potential impacts to marine mammal habitat were discussed previously in this document (see the "Anticipated Effects on Habitat" section). Although some disturbance is possible to food sources of marine mammals, the impacts are anticipated to be minor enough as to not affect rates of recruitment or survival of marine mammals in the area. Based on the vast size of the Arctic Ocean where feeding by marine mammals occurs versus the localized area of the marine survey activities, any missed feeding opportunities in the direct project area would be minor based on the fact that other feeding areas exist elsewhere.

The authorized takes represent 0.13% of the Beaufort Sea population of approximately 39,258 beluga whales (or 1.35% of the Eastern Chukchi Sea population of approximately 3,710 beluga whales, or a mix of each population; Allen and Angliss 2010), 1.59% of Aleutian Island and Bering Sea stock of approximately 314 killer whales, 0.004% of Bering Sea stock of approximately 48,215 harbor porpoises, 0.02% of the Eastern North Pacific stock of approximately 19,126 gray whales, 0.24% of the Bering-Chukchi-Beaufort population of 15,232 bowhead whales assuming 3.4 percent annual population growth from the estimate of 10,545 animals (Zeh and Punt, 2005), and

0.20% of the Alaska stock of approximately 1,003 minke whales. The take estimates presented for bearded, ringed, spotted, and ribbon seals represent 0.01, 0.05, 0.03, and 0.0033% of U.S. Arctic stocks of each species, respectively. These take numbers represent the percentage of each species or stock that could be taken by Level B behavioral harassment if each animal is taken only once. In addition, the mitigation and monitoring measures (described previously in this document) that are included in the IHA (if issued) are expected to reduce even further any potential disturbance to marine mammals.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and monitoring measures, NMFS finds that BP's proposed 2012 OBC seismic survey in the Simpson Lagoon of the Alaskan Beaufort Sea may result in the incidental take of small numbers of marine mammals, by Level B harassment only, and that the total taking from the marine surveys will have a negligible impact on the affected species or stocks.

Unmitigable Adverse Impact Analysis and Determination

NMFS has determined that BP's proposed 2012 OBC seismic survey in the Beaufort Sea will not have an unmitigable adverse impact on the availability of species or stocks for taking for subsistence uses. This determination is supported by information contained in this document and BP's CAA and draft POC. BP has adopted a spatial and temporal strategy for its Simpson Lagoon operations that should minimize impacts to subsistence hunters. Specifically, BP's Simpson Lagoon OBC seismic survey would occur during the July to October open water season, would not start its airgun operations

within the barrier islands before July 25, and will terminate its operations outside the barrier islands after August 25 before the fall bowhead whale hunt. Due to the timing of the project and the distance from the surrounding communities (approximately 35 miles northeast from Nuiqsut, 35 miles west from Cross Island, 150 miles west from Kaktovik and 180 miles east from Barrow), it is anticipated to have no effects on spring harvesting and little or no effects on the occasional summer harvest of beluga whale, subsistence seal hunts (ringed and spotted seals are primarily harvested in winter while bearded seals are hunted during July-September in the Beaufort Sea), or the fall bowhead hunt.

In addition, based on the measures described in BP's POC and CAA, the proposed mitigation and monitoring measures (described earlier in this document), and the project design itself, NMFS has determined that there will not be an unmitigable adverse impact on subsistence uses from BP's OBC seismic survey in the Simpson Lagoon of the Beaufort Sea.

Endangered Species Act (ESA)

There are two marine mammal species listed as endangered under the ESA with confirmed or possible occurrence in the project area: the bowhead and humpback whales. In addition, there are two marine mammal species that are currently being proposed for listing under the ESA with confirmed occurrence in the proposed project area: ringed and bearded seals. NMFS' Permits and Conservation Division consulted with NMFS' Alaska Regional Office Division of Protected Resources under section 7 of the ESA on the issuance of an IHA to BP under section 101(a)(5)(D) of the MMPA for this activity. A Biological Opinion was issued on June 21, 2012, which concludes that issuance of the IHA is not likely to jeopardize the continued existence of the ESA-listed marine mammal

species and species proposed for ESA-listing. In addition, analysis by NMFS AKRO showed that humpback whale will not be affected, therefore, no take was authorized. NMFS will issue an Incidental Take Statement under this Biological Opinion which contains reasonable and prudent measures with implementing terms and conditions to minimize the effects of take of listed species.

National Environmental Policy Act (NEPA)

NMFS prepared an EA that includes an analysis of potential environmental effects associated with NMFS' issuance of an IHA to BP to take marine mammals incidental to conducting its OBC seismic survey in the Simpson Lagoon area of the Beaufort Sea during the 2012 open water season. NMFS has finalized the EA and prepared a FONSI for this action. Therefore, preparation of an EIS is not necessary.

Authorization

As a result of these determinations, NMFS has issued an IHA to BP to take marine mammals incidental to its 2012 OBC open-water seismic survey in the Simpson Lagoon area of the Beaufort Sea, Alaska, provided the previously mentioned mitigation, monitoring, and reporting requirements are incorporated.

Dated: June 29, 2012.

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Helen M. Golde,
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